

four finger-like pointed branches (Fig. 1e). The thoracic hairs which project to the front nearly hide the head and appendages. The spines of the last segment are now of the same colour as the body. On the 12<sup>th</sup> and 13<sup>th</sup> day of the last instar, the larvae start to pupate.

Larvae of the Palm King are voracious feeders. Most of the time, they remain on the underside of the leaf, eating from the tip of the leaf working towards the base. The early instars prefer to remain in group and never stray away. But, as they mature, some moved away from the group, the behaviour being most marked in the last instar and peaked towards the days of pupation. The later instars prefer to remain on the upper side of the leaf as well.

With regard to coloration, the fifth instars show marked difference in their ground colour, some being more brownish and some more greyish. A link between the body colour and the future sex of the adult has to be established with more studies. A larger number of the caterpillars have to be observed to establish this link.

**Pupa:** The process of pupation takes about half a day. The greenish spindle-shaped pupa is well-camouflaged among the pointed leaves of the host plant (Fig. 1f). Initially, it is semi-transparent but later it becomes more opaque. The pupa has veins and lines similar to that of the leaves of the host plant, all veins ending at the pointed lower end of the pupa. The pupa becomes transparent on the eve of hatching, with the wings and head clearly visible. The hatching takes place on the 12<sup>th</sup> and 13<sup>th</sup> day of pupation.

**Eclosion:** All of the pupae hatched on two consecutive days between 0800 and 0900 hrs. The imago rested for about an hour and went on wings to rest in the shady bushes nearby.

**Imago:** ♂ ♀: Chocolate brown in colour having a wing span of 80-90 mm in specimens bred at Thenmala (Fig. 1g), although Wynter-Blyth (1957) states the wing span as 100-125 mm. Apex of forewing slightly conical; termen more or less straight; dorsum straight. Hind wing is with the dorsum expanded and flap-like, bare and pale brownish. Tornus produced into a slight conical lobe bearing two round black spots surrounded by a white ring dorsally and ventrally. Under side of both wings with a narrow marginal white band and a series of brown and white straight bands across. Two large eye spots at the apical and discal areas of the hind wing. Hind wing lobed at tornus. Velvety brown above. Upper forewing with diffuse yellowish band (which is prominent in female) just below apex and a narrow terminal yellowish band. Upper side of hindwing border-pale brown, bearing a dark marginal line.

**Female:** Abdomen with tufts on either side. Upperside of hind wing with fold and tuft and long erect hairs along base.

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### 15. ON THE COLLECTION OF THREE INTERESTING SPECIES OF *LEJEUNEA* LIB. FROM ABBOTT MOUNT, WESTERN HIMALAYA, INDIA

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#### Introduction

The genus *Lejeunea* Lib. (Hepaticae; Division Bryophyta) is represented by 21 species in India, of which, till recently, only seven species were known from the Western

Himalaya, namely *L. bidentula* Herz., *L. cocoes* Mitt., *L. cavifolia* (Ehrn.) Lindenb., *L. nepalensis* Steph., *L. tuberculosa* Steph., *L. flava* (Swartz.) Nees and *L. wightii* Lindenb. (Mizutani 1964, 1971; Srivastava and Parihar 1986;

Bapna and Kachroo 2000; Singh 2001; Singh and Singh 2004). Among these, *L. flava*, *L. nepalensis* and *L. cocoes* are little known and needed further verification based on fresh collection from the region.

During the process of taxonomic revision of the genus, the authors critically examined specimens of *Lejeunea* collected from Abbott Mount, near Lohaghat in Champawat district, Uttarakhand (28° 22' N; 80° 06' E; altitudes 1,950 to 2,010 m). Based on this study a key for the identification of the above mentioned taxa is being given in this communication along with their salient morphological features, specimens examined and the present distribution.

- 1 Lower leaves distant, never two times wider than stem width ..... 2  
 — Lower leaves imbricate, nearly four times wider than stem width ..... *L. flava*  
 2 Lower leaves obliquely spreading never lunate; stem flexuose (zig-zag), sparsely branched ..... *L. nepalensis*  
 — Lower leaves ovate-lunate; stem straight, frequently branched ..... *L. cocoes*

**1. *Lejeunea flava* (Swartz.) Nees** (Fig. 1: A-I)

*Lejeunea flava* (Swartz.) Nees *Naturg. Europ. Leberum.* 3: 277 (1838); Mizutani, *Journ. Hattori Bot. Lab.* 24: 207 (1961).

The species can be identified on the basis of (i) imbricate leaves with slightly convex and oblong ovate leaf-lobes, (ii) closely imbricate lower leaves, nearly four times broader than the stem, bilobed for 1/3 the length, and (iii) pyriform sporangial leaves, which is slightly and obtusely 5-angled above. There is a slight variation in the degree of overlap in lower leaves among the plants collected from Himachal Pradesh and Uttarakhand, and interestingly the descriptions based on specimens collected from Nilgiris (Srivastava and Verma 2004) resemble closely with that of Uttarakhand.

The species prefers smooth bark of the trees of *Pieris ovalifolia* and is found in association with the mosses, such as *Brothera himalayana* Broth. and *Dicranum* sp.

**Type locality:** Jamaica

**Distribution:** West Indies, Bermuda, Mexico, Guatemala, Honduras, Panama, Nepal, Japan, Formosa, Sumatra, Europe, Madeira, Tenerife, Australia, Africa, New Zealand N. America and S. America. INDIA: North-eastern Hill States (Manipur, Meghalaya), West Bengal, southern India (Dodabetta, Nilghiri Hills, Ootacamund, Palni Hills, Kerala), and Western Himalaya (Himachal Pradesh). This is the first report of this species from the state of Uttarakhand.

**Specimen Examined:** Abbott Mount in Champawat district in Uttarakhand: H-79/10, 2,010 m above msl, January 1979, Herbarium, Allahabad University.

**2. *Lejeunea nepalensis* Steph.** (Fig. 1: J-Q)

*Lejeunea nepalensis* Steph. *Sp. Hepat.* 5: 780 (1915); Mizutani, *Journ. Hattori Botanical Lab.* 34: 455 (1971).

The species can be identified by its (i) flexuose stem, (ii) seven rows of cortical cells, which are much larger than the medullary cells, (iii) strongly arched base of the dorsal margin of the leaf-lobe, (iv) small leaf-lobule, about 1/4 the length of the leaf-lobe, (v) obliquely spreading leaves, and (vi) it being dioecious.

The plants of the present population from Kumaun are sturdier and have greater number of microsporangia per plant.

The species is endemic to the Indian subcontinent. It grows on the trunks of the oak tree, *Quercus leucotrichophora* along with some pleurocarpous mosses.

**Type locality:** Nepal.

**Distribution:** INDIA: Eastern Himalaya (Darjeeling, Assam, Sikkim); Western Himalaya (Mussoorie). This is the first report of this species from Kumaon region.

**Specimen Examined:** Abbott Mount in Champawat district, Uttarakhand: H-79/56, 2,000 m above msl, June 1979, Herbarium, Allahabad University

**3. *Lejeunea cocoes* Mitt.** (Fig. 2: A-N)

*Lejeunea cocoes* Mitt. *Journ. Proc. Linn. Soc., London,* 5: 114 (1861); Mizutani, *Journ. Hattori Bot. Lab.* 26: 176 (1963)

The diagnostic characters of the present species include (i) whitish green, irregularly pinnately branched plants, (ii) distant, sub-erect spreading leaves, (iii) distantly placed lunate lower leaves, (iv) dioecious sexuality, (v) female bracteole being connate with bracts at both sides, and (vi) obovate, inflated sporangial leaves, weakly 5-keeled.

This species grows on the trunk of the oak tree, *Quercus leucotrichophora*, under very shady and humid conditions. The species was recorded from the bark of the coconut tree, *Cocos nucifera*, in the 'type' locality.

**Type locality:** Balagom, Ceylon

**Distribution:** Sarawak, Java and China. This is the first authentic report of the species from India.

**Specimen Examined:** Abbott Mount in Champawat district, Uttarakhand: 301/78, 2,010 m above msl, January 1978, Herbarium, Allahabad University.

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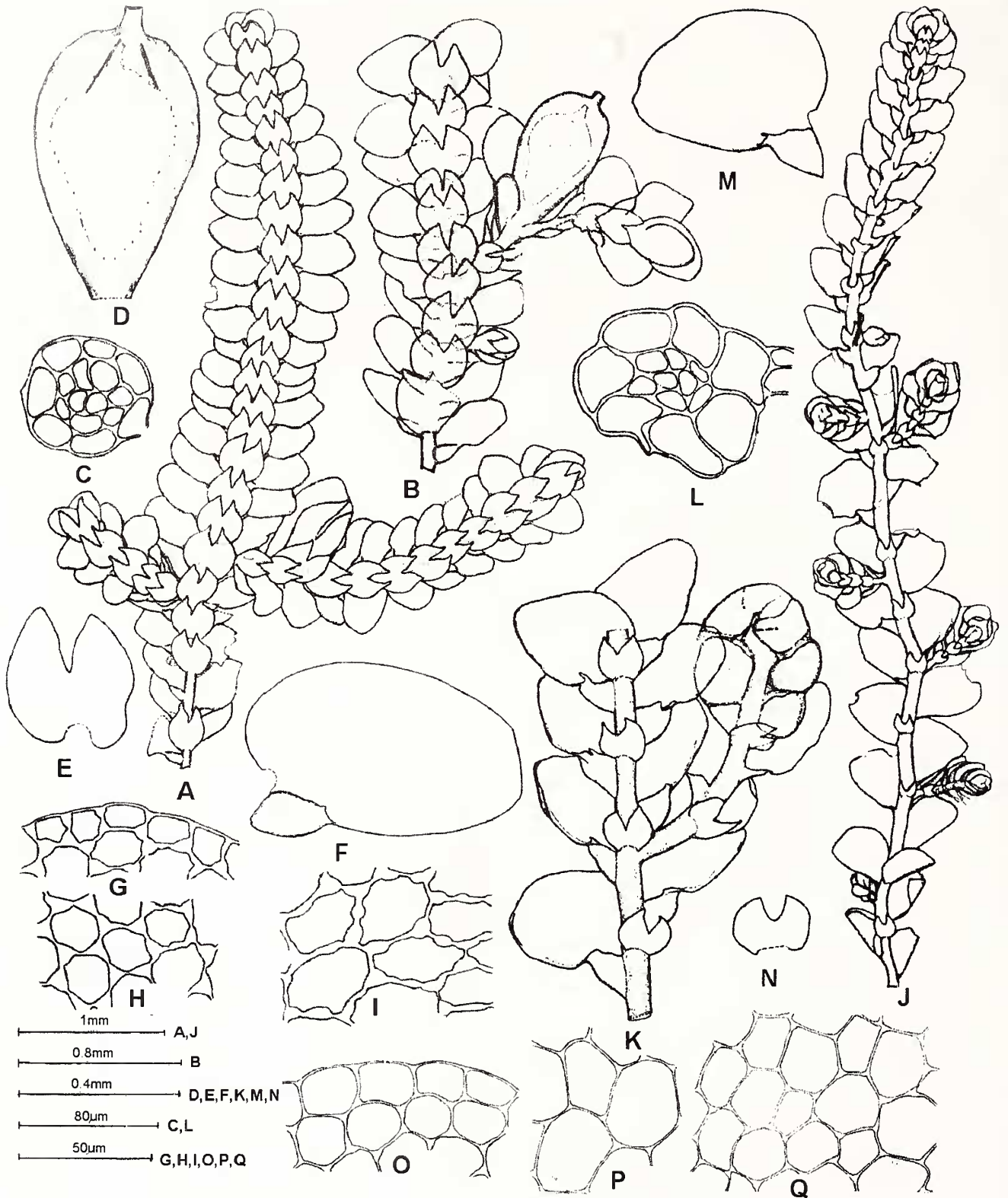


Fig. 1: *Lejeunea flava* (Swartz.) Nees (A-I): A. Part of a plant, ventral view; B. Part of the plant with perianth, ventral view; C. Stem, t.s.; D. Perianth, magnified; E. Underleaf; F. Leaf; G. Marginal cells of the leaf-lobe; H. Median cells of the leaf-lobe;

I. Basal cells of the leaf-lobe

*Lejeunea nepalensis* Steph. (J-Q): J. Part of a plant, ventral view; K. Part of the plant with male inflorescence, ventral view; L. Stem, t.s.; M. Leaf; N. Underleaf; O. Marginal cells of the leaf-lobe; P. Basal cells of the leaf-lobe; Q. Median cells of the leaf-lobe

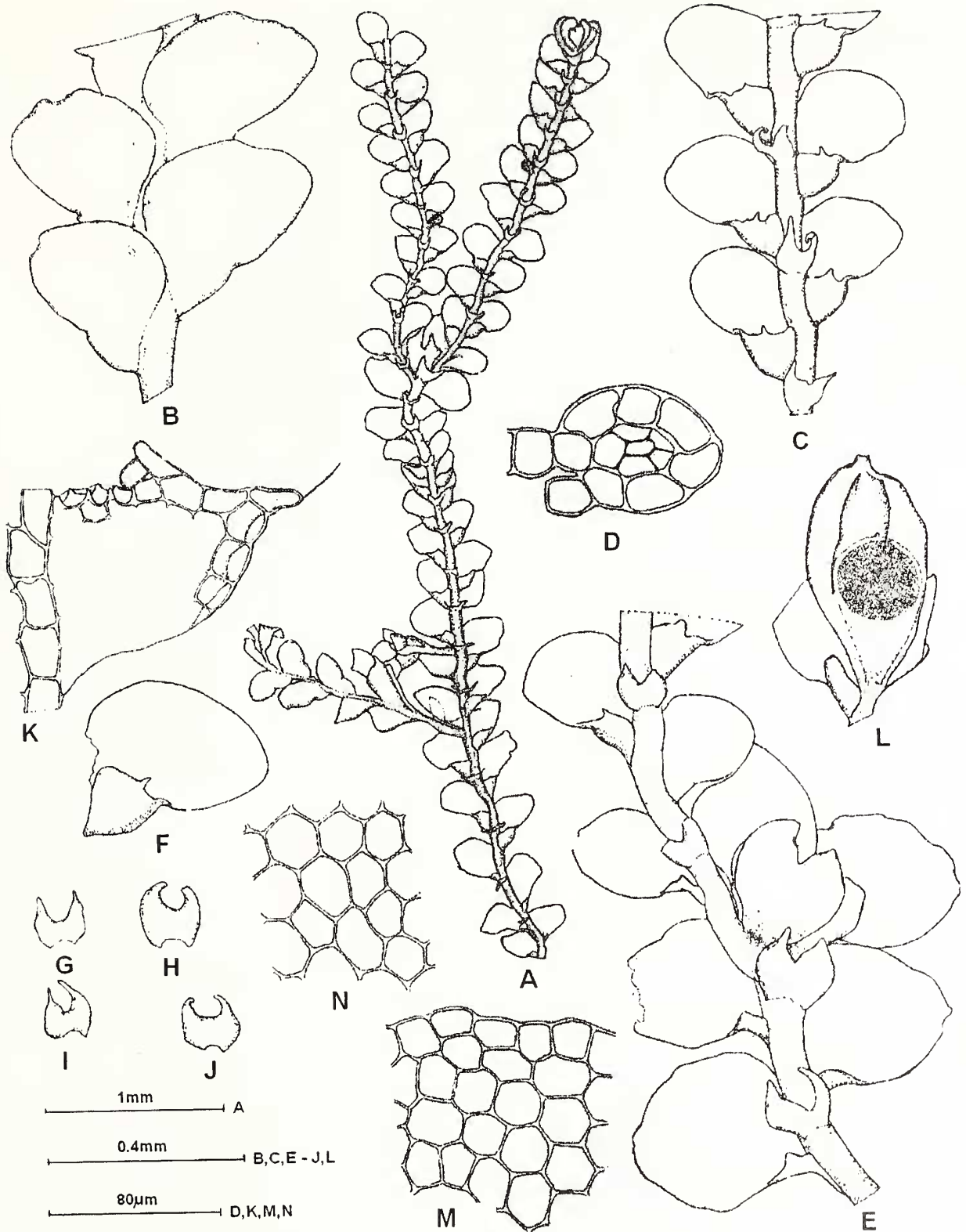


Fig. 2: *Lejeunea cocoes* Mitt. (A-N):  
 A. Part of a plant, ventral view; B. Part of the plant, dorsal view; C. Part of a plant, ventral view;  
 D. Stem, t.s.; E. Part of the plant with a sub floral innovation (though perianth is absent, bracts and bracteoles are present);  
 F. Leaf; G, H, I, & J. Underleaves; K. Leaf-lobule magnified; L. Perianth; M. Marginal cells of the leaf-lobe;  
 N. Median cells of the leaf-lobe

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16. *CALATHODES POLYCARPA* OHWI (RANUNCULACEAE) — A NEW RECORD FOR INDIADEBABRATA MAITY<sup>1</sup> AND G.G. MAITI<sup>2</sup>

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The genus *Calathodes* Hook. f. & Thomson (Family: Ranunculaceae) was established by Hook. f. & Thomson (1855) with the description of only one species *Calathodes palmata* Hook. f. & Thomson based on the collection from Sikkim, 3,000 m above msl. J.D. Hooker, *s.n.*

Later, three more species were added, namely *C. oxycarpa* Sprague (in Bull. Misc. Inform. Kew 1919: 403.1919); *C. polycarpa* Ohwi (in Acta Phytotax. Geobot. 2: 153.1933) and *C. unciiformis* Wang (in Bull. Bot. Res., Harbin 16: 165.1996), all considered to be endemic to China (Liangqian and Tamura 2001). However, later *C. polycarpa* Ohwi was recorded from Formosa, Japan, by Ohwi (*l.c.*) based on the specimen Ohwi 4211 and also noted to be present in Taiwan.

During the floristic study of Kanchenjunga Biosphere Reserve, Sikkim, as well as Sikkim Himalaya, we collected one specimen from Zemu valley, between Log Bridge and Jakthang (Maity and Maiti 21373) with the following distinguishing features: greenish-white flowers, numerous (*c.* 30) carpels with gibbous-deltoid base and shorter styles, different from that of the commonly known Sikkimese species *C. palmata* Hook. f. & Thomson.

A critical study revealed its identity as *Calathodes polycarpa* Ohwi, which is a new record to India. Moreover, its disjunct distribution is now known in Sikkim (India), Formosa, China, Japan and Taiwan.

The collected specimen of *Calathodes* was identified as *C. polycarpa* Ohwi by matching with the protologue and Liangqian and Tamura (2001), and solely based on the field observation and examination of the collected plants.

Detailed description along with illustration is provided here. It is also compared with *Calathodes palmata* (Table 1)

and a key of known four species of *Calathodes* is given to facilitate its identity.

Key to the species of *Calathodes*

1. Flowers white or greenish white ..... 2
- Flowers yellow ..... 3
2. Lamina 2-3 x 3.2-5 cm; carpels 7-15 ..... *C. oxycarpa*
- Lamina 4-6 x 6-9 cm; carpels 30-60 ..... *C. polycarpa*
3. Carpels less than 20, without projection ..... *C. palmata*
- Carpels more than 30, with projection ..... *C. unciiformis*

*Calathodes polycarpa* Ohwi in Acta Phytotax. Geobot. 2: 153. 1933; Liangqian & Tamura, Fl. China 6: 137. 2001 (Fig. 1).

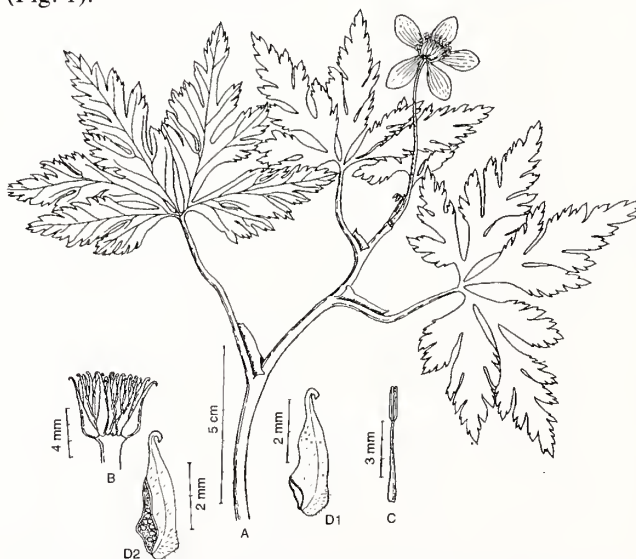


Fig. 1: *Calathodes polycarpa*: A. Habit; B. Etario of follicles (immature); C. Stamen; D1. Carpel; D2. Carpel splitted in the lower part showing ovules (from Maity & Maiti 21373)